

- (b) forming a first insulating film over said first main surface of said semiconductor substrate,
- (c) forming an embedded interconnection slot in said first insulating film over the main surface,
- (d) forming a connecting hole in a bottom surface of said embedded interconnection slot, connected to a lower conducting layer,
- (e) forming a conducting barrier film over a surface region of the first insulating film outside said embedded interconnection slot and said connecting hole and the bottom surface and side surface of said embedded interconnection slot and said connecting hole,
- (f) forming a metal film having copper as its main component over the conducting barrier film so as to fill said embedded interconnection slot and said connecting hole,
- (g) removing the metal film outside said embedded interconnection slot and said connecting hole by a chemical mechanical polishing method using a polishing slurry containing an oxidizing agent of copper and organic acid capable of dissolving an oxide of copper within a corrosion region of copper, thereby forming an embedded metal interconnection layer having copper as its main component embedded in said interconnection slot and in said connecting hole in which said conducting barrier film is formed,
- (h) performing plasma treatment to the surface region of the first insulating film and a surface of the embedded metal interconnection layer in a gas atmosphere having reducing properties; and

(i) after step (h), forming a cap insulating film so as to cover said embedded metal interconnection layer and the upper surface of said first insulating film,
wherein:

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the concentration of components other than copper in said embedded metal interconnection layer in the finished semiconductor integrated circuit device does not exceed 0.8At%, and

the film thickness of the thinnest part of said conducting barrier film in the side walls of said embedded interconnection slot and said connecting hole is less than 10 nm.

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25. (amended) A method of fabricating a semiconductor integrated circuit device as defined in Claim 20, wherein said gas atmosphere comprises hydrogen as its principal component element.

26. (amended) A method of fabricating a semiconductor integrated circuit device as defined in Claim 20, wherein said gas atmosphere also has a nitriding action.

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29. (amended) A method of fabricating a semiconductor integrated circuit device as defined in Claim 20, wherein the proportion of abrasive particles in the polishing slurry does not exceed 0.5% as a mass ratio.

30. (amended) A method of fabricating a semiconductor integrated circuit device as defined in Claim 20, wherein the proportion of abrasive particles in the polishing slurry does not exceed 0.1% as a mass ratio.

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31. (amended) A method of fabricating a semiconductor integrated circuit device as defined in Claim 20, wherein the proportion of abrasive particles in the polishing slurry does not exceed 0.05% as a mass ratio.
